

Examination of Software for Rapid Analysis of Single Source DNA Profiles

A significant bottleneck in getting DNA profiles into DNA databases to help solve crimes is the data review process. Expert system software has been evaluated in terms of performance on single-source DNA samples.

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Forensic DNA testing typically involves two different types of samples: (1) single source reference samples from convicted offenders, suspected perpetrators or biological relatives of missing persons and (2) casework evidence that is often a mixture of victim and perpetrator and may be compromised in terms of quality and quantity of material. While casework samples often are challenging to analyze, the sheer number of the relatively easily analyzed reference samples is itself a bottleneck that requires development and validation of high-throughput data review procedures. As of September 2006, the National DNA Index System maintained by the FBI Laboratory contained over 3.6 million convicted offender profiles but only 150,000 forensic casework profiles. Thus, 96% of samples on the national DNA database are single source reference samples.

NIST scientists are assisting law enforcement by helping facilitate the development of DNA human identity testing databases.



In January 2006, the NIST Human Identity Project team purchased the Forensic Science Service FSS-i3 Expert System Software from Promega Corporation (Madison, WI). Short tandem repeat (STR) typing data for over 1,000 samples have been evaluated thus far with the FSS-i3 software and compared with manually evaluated results. Several Excel-based software tools have been developed to aid conversion of data formats and comparison of manually produced and expert system derived allele calls. These tools are available at: <http://www.cstl.nist.gov/bio-tech/strbase/software.htm>. Our experience with the concordance studies has been the subject of several presentations and likely future publications. Future studies will involve examining the ability of expert systems to decipher

DNA mixtures similar to what would be encountered in forensic casework.

NIST scientists also play an advisory role on the National Institute of Justice (NIJ) Expert System Testbed (NEST) project and have aided review of data obtained from forensic DNA laboratories with various expert system software programs.

Presentations:

C.R. Hill, "*NIST Experience with FSS-i3 Software*", Expert Systems Workshop held in conjunction with the 2nd Annual Present and Future Technological Advances in Human Identification Conference (Roanoke, VA), March 27, 2006, [[.pdf](#)]

A.E. Decker, "*NIST Experience with FSS-i3 Software*" Promega Technology Tour (Phoenix, AZ), June 22, 2006, [[.pdf](#)]

C.R. Hill "*NIST Experience Using v4.1.3 of FSS-i3 Software*" 17th International Symposium on Human Identification (Nashville, TN), October 11, 2006, [[.pdf](#)]

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